

Yukinobu KUWAHARA*: *Metzgeria fukuokana*, sp. nov., with
notes on the monoecious species of *Metzgeria* (Hepaticae)

桑原幸信：フタマタゴケ科(苔類)の1新種, 及び雌雄
同株のフタマタゴケについて

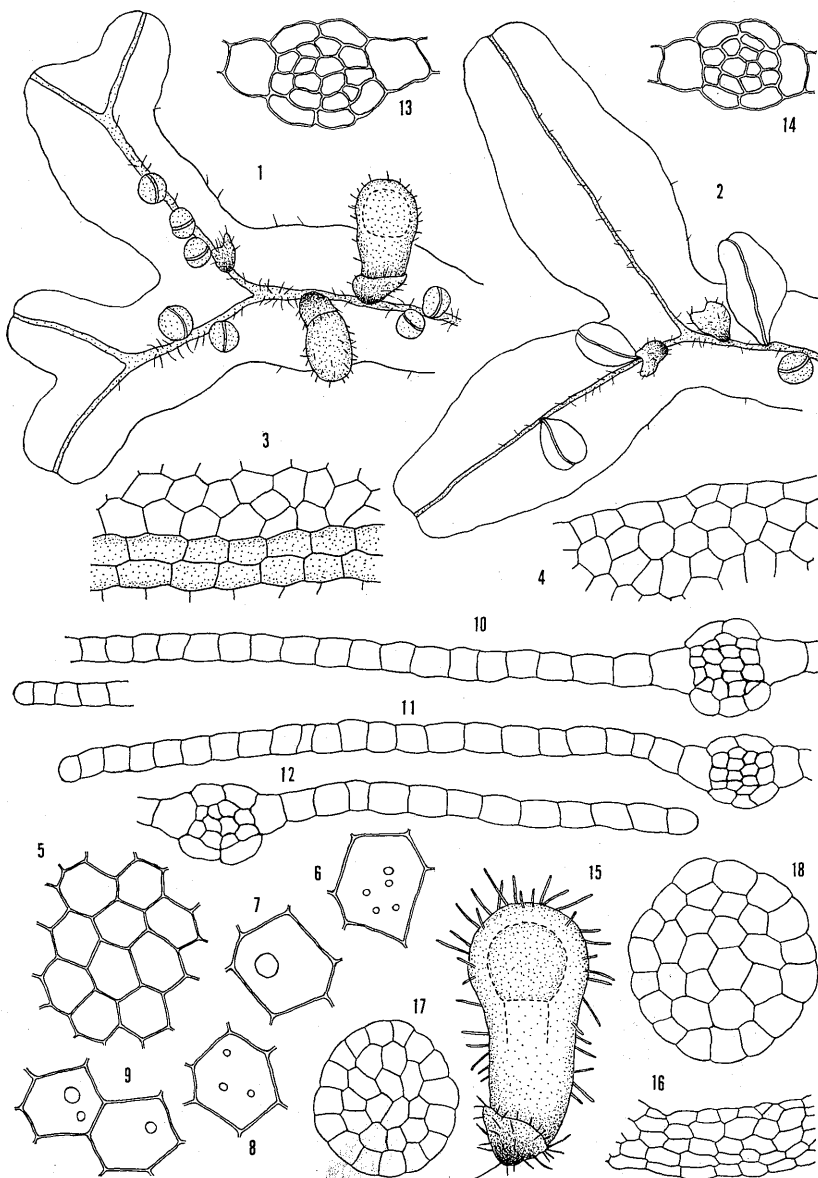
The oil bodies of the Metzgeriaceae are indistinct, and only occasionally are minute, scattered oil bodies observed. Those as large as are found in the species described below are unique in the family. In addition to the oil bodies, this new species differs from all other monoecious species of *Metzgeria* in having a distinctly larger number of cells in the seta cross-section: both of these are established taxonomic characters in the Hepaticae.

Metzgeria fukuokana Kuwah., sp. nov. (Figs. 1-21).

Monoica. Frons dichotoma, 1.0-1.5 cm longa, 0.6-1.6 mm lata. Alae 13-27 cellulas latae, cellulae alarum mediae 32-46-(55) \times 23-36 μ m. Costa cellulis corticalibus anticae 2, posticae 2-3 seriatis. Gemmae ignotae. Seta cum 28-32 cellulas crossa.

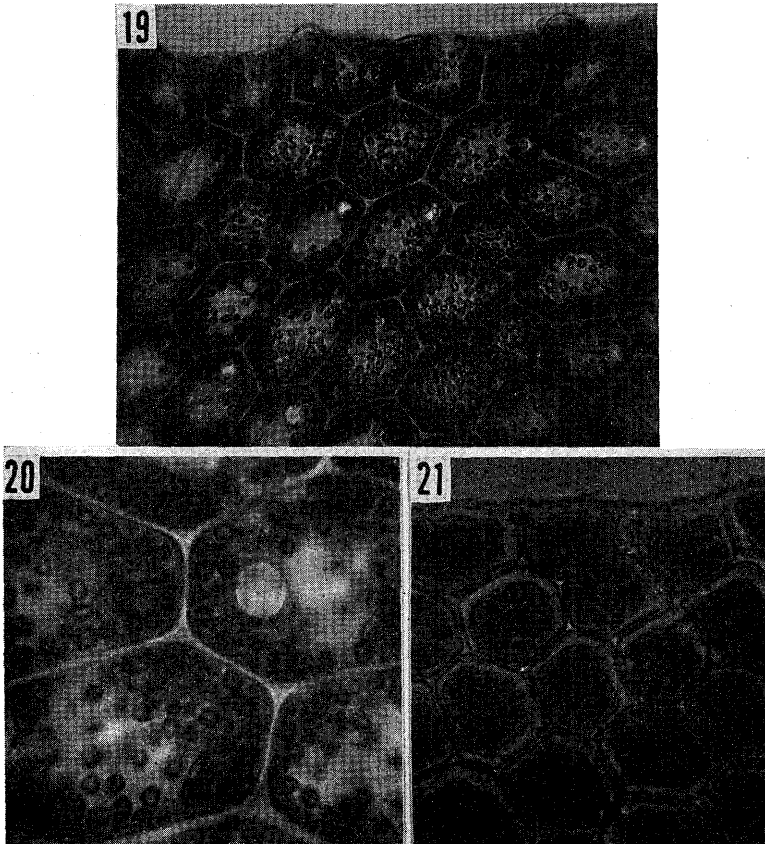
Thallus dichotomously branched, plane or slightly convex dorsally, occasionally somewhat narrowed toward the broadly obtuse thallus-apex, pale-green when dry, 1.0-1.5 cm long, 0.6-1.6 mm wide; adventitious shoots commonly produced. Midrib bounded by 2 rows of epidermal cells on the dorsal side, and 2-3 epidermal cells on the ventral side. Lamina 13-27 cells broad from midrib to the thallus-margin. Cells of thallus somewhat pellucid, cuticle smooth. Laminal cells 32-46-(55) \times 23-36 μ m in the middle thallus, 21-43 \times 18-29-(32) μ m at the thallus-margin, walls slightly thickened, trigones minute. Cells of the midrib 25-60 \times 20-43 μ m on the dorsal side, 25-53 \times 20-48 μ m on the ventral. Oil bodies rounded, flat, 4-14 μ m in diameter, without granular structure, 1-2 per thallus-cell, smaller oil bodies up to 5 per cell, bluish-grey. Hairs sparsely produced on the ventral side of the midrib, only occasionally produced at the thallus-margin, borne singly; hairs somewhat flexuous, 85-210-(430) μ m long. Gemmae not seen. In cross-section

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Figs. 1-18. *Metzgeria fukuokana* Kuwah. 1-2. Part of thallus, ventral view, $\times 16$: 1—with male branches, female involucres, calyptrae, 2—with male branch, female involucres, adventitious shoots. 3. Epidermal cells of midrib on the dorsal side, and neighboring laminal cells, $\times 120$. 4. Cells along the laminal margin, $\times 120$. 5. Cells at the middle lamina, $\times 160$. 6-9. Oil bodies, $\times 304$. 10-12. Cross-section of thallus, $\times 120$. 13-14. Cross-section of midrib, $\times 160$. 15. Calyptra with developing sporophyte, $\times 32$. 16. Cross-section of calyptra-wall, $\times 160$. 17-18. Cross-section of seta, $\times 120$.

of the thallus midrib arched on both sides, $70-90\ \mu\text{m}$ thick, dorsal epidermal cells $11-20\ \mu\text{m}$ thick, ventral epidermal cells $11-23\ \mu\text{m}$ thick; medulla of (6)-9-13-(17) cells in (2)-3-4-(5) tiers, medullary cells $9-25\times 6-16\ \mu\text{m}$, walls somewhat thickened; laminal cells $27-40\ \mu\text{m}$ thick in the middle, occasionally somewhat inflated. Monoecious. Male branches globose or subglobose, $190-350\ \mu\text{m}$ in diameter, hairs rarely produced on the outer surface, cells of the midrib $32-61\times 10-18\ \mu\text{m}$, laminal cells $29-50\times 21-34\ \mu\text{m}$; female involucre obovate, strongly convex, $250-390\ \mu\text{m}$ long, hairy along the margin and on the outer surface, the cells $20-40\times 16-29\ \mu\text{m}$. Calyptrae fleshy, club-shaped, up to



Figs. 19-21. *Metzgeria fukuokana* Kuwah. Oil bodies, 21—with some plasmolysis; 19, 21, \times ca. 350, 20, \times 700.

1.3 mm long (with immature capsules), hairy on the outer surface, cells of the outer surface $29-70 \times 21-36 \mu\text{m}$, walls and trigones somewhat thickened; the calyptra-wall 5-7 cells thick in cross-section. Setae in cross-section consisting of 15-17 epidermal cells and 11-15 inner cells, totally of 26-32 cells. Mature capsules not seen.

Japan. Fukuoka Prefecture: Ohnojo-shi, Ushikubi, alt. ca. 30 m, shrine wood, on tree trunk (*Cinnamomum*), 30 December 1977, Coll. Y. Kuwahara 9014 (Holotypus NICH, Isotypus NY); 12 February 1971, Coll. Y. Kuwahara 7900.

The oil bodies, as ordinarily seen, are light green-yellow with reflected light of the chloroplasts. They lack granular structure and are generally similar to oil globules found throughout the plant kingdom. They are present throughout the thallus-tissue, and their size and number per cell is not related to the developmental stage of thallus-cells, except for the immediate area around the apical meristem. Oil bodies previously known in *Metzgeriaceae* are $0.5-2.0 \mu\text{m}$ in diameter and up to about 80 per cell, while the ones present in this new species are $4-14 \mu\text{m}$ in diameter, 1-2-(5) per cell.

The total number of 26-32 cells of the seta is large, as opposed to the 14-26 cells of all other monoecious species. The two remaining monoecious Japanese *Metzgeria* species, *M. conjugata* Lindb. and *M. japonica* (Hatt.) Kuwah. have 18-23 cells in seta cross-section (consisting of 14-16 epidermal cells and 4-7 inner cells), and a somewhat smaller width of the lamina of (9)-13-20-(24) cells wide.

Notes on monoecious *Metzgeria* species Of some 200 species in the family *Metzgeriaceae*, only 14 species are recognized with a monoecious sexual condition. These monoecious species are morphologically very similar to each other, and a summary of their features is given below.

Thallus dichotomously branched, moderate in size, 1-4 cm long, obtuse at the apex, pale-green when dry. Epidermal cells of the midrib in 2 rows dorsally, in 2-5-(6) rows ventrally; lamina (8)-12-22-(27) cells broad from midrib to the thallus-margin. Laminal cells $33-60-(103) \times 27-40-(54) \mu\text{m}$ in the middle, cuticle smooth. Midrib in cross-section consisting of (6)-10-22 medullary cells in (2)-3-5 tiers, laminal cells plane, not protruding. Hairy at the thallus-margin and on the ventral side of the midrib, occasionally sparsely hairy on the ventral laminae; hairs straight, rarely falcate. Gemmae not

produced. Sporophytes commonly produced. Setae in cross-section consisting of 10-17 epidermal cells and 4-9-(15) inner cells, totalling of 14-26-(32) cells. Capsule-valves 420-800 μm long, 170-400 μm wide in the middle; elaters 5.5-8.0 μm wide in the middle, spores 15-22-(26) μm in diameter.

Blue pigmentation, a tapered thallus, gemmae produced on the dorsal surface of the thallus, and mucilaginous gemmae are characters not observed in this group of species. It is highly improbable that additional new monoecious species of *Metzgeria* will be found with the taxonomic characters exceeding the range of variation described above. The structural similarity of these 14 species becomes even closer when such characters are excluded as large thallus-cells (56-103 \times 35-54 μm in the middle lamina) and falcate thallus-hairs of the narrowly endemic *Metzgeria monoica* Kuwah. et Engel of southern Chile. It is also known that the monoecious *Metzgeria conjugata* Lindb. has a smaller range of variation in the capsule-wall structure than do the dioecious *M. decipiens* (Massal.) Schiffn. & Gotts. and *M. furcata* (L.) Dum. (Kuwahara 1976).

There is often continuous morphological variation in relationship to geographical range. This variation is most typically observed in the structure of the midrib. *Metzgeria conjugata* Lindb. is morphologically well-developed in Europe with the midrib of the species covered by (2)-3-5-(6) epidermal rows of cells on the ventral side. The midrib structure gradually becomes smaller in plants found in the lower latitudes. Broadly speaking, in North America and Japan there are 2 to 4 rows of epidermal cells on the ventral surface, while in tropical Asia and other lower latitudinal regions the midrib has 2 epidermal rows of cells on the ventral side. However some variations do occur occasionally in this cline, for instance, a monoecious *Metzgeria* from Malay Peninsula (alt. 1200 m, Kuwahara 8476) has a midrib structure of 2-5 epidermal rows on the ventral side.

The Javanese *Metzgeria conjugata* Lindb. var. *minor* Schiffn. has a very small thallus, and seems to be an extremely reduced taxon within the monoecious *Metzgerias* and I propose specific status, *Metzgeria minor* (Schiffn.) Kuwah. Also in forests of southeast Asia a great reduction of the gametophyte has been observed in *Metzgeria foliicola* Schiffn. (Kuwahara 1978).

While the monoecious species of *Metzgeria* are commonly distributed in

the northern temperate zone, tropical Asia and Pacific Oceania, such species are uncommon in South America and Africa, and absent in New Zealand. A detailed study of morphological variation within the monoecious *Metzgeria* species is needed, using as many specimens as possible from various geographical areas.

For the Japanese populations, I recognize *Metzgeria japonica* (Hatt.) Kuwah. to include those plants with a midrib covered by 2-(3) rows of epidermal cells on the ventral side, and *M. conjugata* Lindb. for those plants with the ventral epidermal cells of the midrib in (2)-3-4 rows. In addition, the thallus of *Metzgeria conjugata*, compared to *M. japonica*, is wider in cell number and more often produces geminate hairs at the thallus-margin.

A list of the 14 known monoecious species of *Metzgeria* follows (taxa below species level are not included).

Metzgeria conjugata Lindb., Acta Soc. Sci. Fenn. 10: 495 (1875). Distribution. Europe, North America, Japan, and Colombia.

Metzgeria fukuokana Kuwah., Jour. Jap. Bot. 53: 264 (1978). Distribution. Japan (Fukuoka).

Metzgeria himalayensis Kashyap, Jour. Bombay Nat. Hist. Soc. 26: 280 (1917). Distribution. Himalaya.

Metzgeria japonica (Hatt.) Kuwah., **comb. nov.** Basionym: *Metzgeria conjugata* Lindb. var. *japonica* Hatt., Jour. Hattori Bot. Lab. 15: 80 (1955). —*Metzgeria conjugata* Lindb. subsp. *japonica* (Hatt.) Kuwah., Jour. Hattori Bot. Lab. 20: 135 (1958). Distribution. Japan and Himalaya.

Metzgeria lindbergii Schiffn., Kais. Akad. Wien 67: 182 (1898). Distribution. Chiefly southeast Asia.

Metzgeria mauina Steph., Sp. Hepat. 6: 55 (1917). Distribution. Hawaii, New Caledonia, eastern Himalaya.

Metzgeria minor (Schiffn.) Kuwah., **comb. nov.** Basionym: *Metzgeria conjugata* Lindb. var. *minor* Schiffn., Nova Acta 60(2): 271 (1893). Distribution. Java.

Metzgeria minuta Kuwah., Jour. Hattori Bot. Lab. 31: 166 (1968). Distribution. Philippines (Luzon I.)

Metzgeria monoica Kuwah. et Engel, Hikobia 8(3-4): in press (1978). Distribution. Chile (Brunswick Peninsula).

Metzgeria oceanica Kuwah., Jour. Hattori Bot. Lab. 23: 22 (1960). Dis-

tribution. Hawaii, New Caledonia, Samoa, and Fiji.

Metzgeria pectinata Steph., Sp. Hepat. 6: 58 (1917). Distribution. Hawaii, New Caledonia, Samoa, Fiji, Tahiti, Borneo, Philippines, and Australia.

Metzgeria santessonii S. Arnell, Sv. Bot. Tidskr. 49(1-2): 235 (1955). Distribution. Chile (Chiloé and Juan Fernández Is.).

Metzgeria saxbyi Pearson, Ann. Crypt. Exot. 4: 70 (1931). Distribution. Gahna, Cameroons, and South Africa.

Metzgeria simplex Lorbeer in K. Müll., Hedwigia 80: 115 (1941). Distribution. Europe.

Two species were previously treated as synonyms under *Metzgeria conjugata* Lindb. subsp. *japonica* (Hatt.) Kuwah. (Kuwahara 1965) and should now be studied further. These are *Metzgeria lutescens* Steph. (Sp. Hepat. 6: 54, 1917) and *Metzgeria madagassa* Steph. (Sp. Hepat. 1: 292, 1900) whose morphological characters are contained entirely within the range of variation of these 14 monoecious *Metzgeria*.

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苔類に特徴的な「油体」はフタマタゴケ科では不明確で、時折微滴状のものが細胞内に散在しているのがみられる程度であったが、今回始めてかなりの大きさのものが見出された。しかし顆粒状の構造は全くなく、形態的にはむしろ植物界一般に共通する「油滴」を想わせる。本新種は福岡市郊外の神社の森に生育し、和名をチクシフタマタゴケとする。

Metzgeria conjugata Lindb. subsp. *japonica* (Hatt.) Kuwah. ヤマトフタマタゴ

ケは *Metzgeria japonica* (Hatt.) Kuwah. となり、日本産雌雄同株のフタマタゴケは *Metzgeria conjugata* Lindb. ドウシュフタマタゴケ (新称) が加って3種となる。

200種を超えるフタマタゴケ科の中、雌雄同株はわずかに14種知られているが、これらの種の形態的特徴は非常に近く、又、地理的变化に方向・連続性がみられる。7,8年前、フタマタゴケ科の亜属、節等の subdivision の試みとして、Sect. Monoica なるものを一時設けていた程である。これら14種の形態的類似性は非常に強く、この形態変化域を超える雌雄同株のフタマタゴケが見出されることは一寸なさそうに思われる。

○武田久吉博士を懐う (小林義雄) Yosio KOBAYASI: Dr Hisayoshi Takeda.

昭和25年度から行なわれた尾瀬ヶ原総合学術調査の結果は28年に報告書“尾瀬ヶ原”の名で発表された。それから丁度4半世紀を経た本年には当時の若者、今はオールドボーイズとなった面々を中心として尾瀬の再調査が進められている。尾瀬と云えば、ここを終生愛し続けた武田博士が直ちに連想される。私も関東大震災の翌々年、前橋を起点として赤城を越え、尾瀬に遊び、長蔵爺さんの案内で燧ヶ岳に登ったが、武田博士は既に日露戦争の年に日光より金精峠を越えて尾瀬を訪れ、その旅行記を“山岳”第1年1号(1906)に発表して居られるから、博士から見れば私はまだ若輩に過ぎない。

さて、この数日来、私は尾瀬関係の手持ちの資料をあれこれと改めて居るうちに、今更ながら武田博士をなつかしさの情が走馬燈のように次から次へと湧き、その2—3を書き留める気になった。氏は昭和47年6月7日に89才で天国へ旅立たれたが、今日がその6年目の命日であるのも奇縁である。

氏が官界にあった期間は極めて短く、永年民間に在って専門の植物学に連なる山岳や、それから尾をひく山地の民俗、石仏にまでも関心をひろめ、趣味の対象とされた。私のように氏とはそれほど深いおつきあいがあった訳ではなく、直接に御指導を受けたこともない身ながら、氏の言行や人品骨柄にひかれる点が多いことから推せば、それぞれの分野で氏に直接に接した人々が氏を追慕するの念はさこそと思われる。

氏が毒舌家であったことには定評があった。男の多くは年を経ると好々爺になり、話すことや書くことに角がとれる。しかしそれは使い古した家具のようなもので、老人ぼけの一現象かも知れない。氏の場合には是と異り、最後年まで酷しい見解を発表して居られたようである。山の自然に対する他人の考えや地図の道すじの僅な誤りに対しては容赦なく追求した。一般人から見れば僅な誤りであっても、これに随ったために命をおとすこともあり、我々の研究の分野でも充分な準備なく、初動を誤ったためにとんでもない結論に達することがよくあるので、氏はこの辺のことをよく考えた上での正論であったと思う。氏が学者であり、毒舌家であり、またその風貌から推して、明治生れの一國者と見做す者があるとすれば、それはとんだ勘違いである。氏は先に逝いた何人かの